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computer readable program code means for causing a computer to effect quantizing the sequence of video data in a single pass using at least one set of quantization matrix tables of said multiple sets of quantization matrix tables; and

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computer readable program code means for causing a computer to effect dynamically switching said quantizing during said single pass from using said one set of quantization matrix tables to using another set of quantization matrix tables of said multiple sets of quantization matrix tables.

Remarks

In the Office Action, claims 1-3, 12, 18-20 and 25 were rejected under 35 U.S.C. §102(b) as being anticipated by Sasaki et al. (U.S. Pat. No. 5,530,478); claim 29 was rejected under 35 U.S.C. §102(e) as being anticipated by Wheeler et al. (U.S. Pat. No. 5,825,680); claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Sasaki et al. in view of Wheeler et al.; claims 5-6, 9 and 21 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sasaki et al.; claims 7-8 & 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sasaki et al. in view of Rick et al. (U.S. Pat. No. 5,987,179); claims 10-11 & 23-24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sasaki et al. in view of Katayama (U.S Pat. No. 5,422,736) and Wheeler et al.; and claims 13-17 & 26-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sasaki et al. in view of Hosono (U.S. Pat. No. 5,796,438). Each of these rejections is respectfully, but most strenuously, traversed to any extent deemed applicable to the claims presented herewith.

Applicants have herein amended independent claims 1, 18 & 29 to more particularly point out and distinctly claim certain features of applicants' invention. These amendments to the claims constitute a bona fide attempt by applicants to advance prosecution of this application and obtain allowance of certain claims and are in no way meant to acquiesce to the substance of the initial rejection. It is believed that the amendments to the claims place all claims in condition for allowance. Claims 1-29 remain pending.

Independent claims 1, 18 & 29 of this application recite an encoder, a method for encoding and a computer program encode product, respectively, wherein:

> storage holds multiple sets of quantization matrix tables, the multiple sets of quantization matrix tables comprise separate, independent sets of quantization matrix tables, each set of quantization matrix tables includes at least one intra matrix table and at least one non-intra matrix table;
>
> a quantizer is provided for quantizing the sequence of video data in a single pass using at least one set of quantization matrix tables of the multiple sets of quantization matrix tables; and
>
> means for dynamically switching switches the quantizer during the single pass quantizing from using the one set of quantization matrix tables to using another set of quantization matrix tables of the multiple sets.

As noted above, the subject matter of claims 1 & 18 was initially rejected as anticipated by Sasaki et al., while that of independent claim 29 was rejected as anticipated by Wheeler et al. Because Sasaki et al. and Wheeler et al. each fails to disclose various features of the above-summarized encode technique, applicants' invention can not be anticipated by, or even obvious based on the teachings thereof. It is well

understood that there is no anticipation unless (1) all the same elements are (2) found in exactly the same situation and (3) are united in the same way to (4) perform the identical function. As amended, applicants' independent claims and the Sasaki et al. and Wheeler et al. patents clearly do not describe overlapping subject matter. To the contrary, there are significant patentable differences between applicants' encoding technique and the encoding approaches described in Sasaki et al. and Wheeler et al.

Sasaki et al. describe an image data compressing apparatus wherein different quantization coefficients are switched during the first scanning, (a time required for scanning the entire frame once), thereby obtaining the optimum quantization and encoding characteristics. Different quantization coefficients Q_0 to Q_t are obtained by the quantization coefficient generator 27. The quantization coefficient generator 27 has a basic quantization table 201, and the basic quantization coefficient output from basic quantization table 201 is supplied to multipliers 202 to 205. In their respective multipliers 202 to 205, the basic quantization coefficient is multiplied by coefficients α_0, α_1, α_2, and α_t, and the obtained quantization coefficients Q_0, Q_1, Q_2, and Q_t are stored in corresponding quantization tables 206 to 209 as shown in FIG. 17 (see column 15, lines 27-39 of Sasaki et al.).

Further, FIG. 18 of Sasaki et al. shows the relationship between the scale factor (coefficients supplied to the multipliers 202 to 205) and the code length. The scale factor α_t is supplied to the multiplier 205, and α_t is multiplied by the basic quantization coefficient, so that an optimum quantization coefficient Q_t is obtained and stored in the quantization table 209. In the subsequent second scanning period, original quantization is performed by using the quantization coefficient

Q_t (see column 16, lines 34-39 of Sasaki et al.).

To summarize, Sasaki et al. describe multiple sets of quantization tables which are used to store the results of the basic table of quantization coefficients multiplied by some scale factor. In Sasaki et al., each table is related to the base quantization matrix table in that it comprises the base multiplied by a scale factor.

In contrast, applicants recite in the independent claims presented herewith that the multiple sets of quantization matrix tables comprise separate, independent sets of quantization matrix tables. Clearly, this is distinct from the quantization tables in Sasaki et al. which expressly teach that the tables are derived from a common, basic quantization matrix table using different scale factors. In comparison, applicants recite multiple separate, independent quantization matrix tables which can be thought of as multiple different basic quantization matrix tables. There is no relationship from one table to the other as recited in applicants' independent claims.

In addition, applicants respectfully submit that there is no dynamic switching in Sasaki et al. between one matrix table to another matrix table, let alone between two independent matrix tables as now recited in the independent claims presented herewith. As clearly stated at column 16, lines 34-39 of Sasaki et al., the obtained quantization coefficient Q_t is stored into the quantization table and <u>used in a subsequent scanning period</u>. Sasaki et al. expressly teach <u>at least two encoding passes</u> in order to switch from one table to the other. This is clearly different from applicants' invention wherein there is a <u>dynamic switching</u> of the quantizer <u>during a single pass quantizing operation</u> from using one set of quantization matrix tables to using another set of quantization matrix tables. In fact, Sasaki

et al. describe an example of the conventional switching approach depicted in FIG. 8a of the present application. This conventional approach is to be contrasted with applicants' claimed invention of FIG. 8b. In FIG. 8a, and in Sasaki et al., the encoding process is repeated on all data by restarting the encoding, while in applicants' approach, the switching is dynamic and there is no need for a second pass or a restarting of the encoding process as shown in FIG. 8b.

For the above-stated reasons, applicants respectfully submit that independent claims 1 & 18 present patentable subject matter over the teachings of Sasaki et al. considered alone, or in combination with any other reference of record. Specifically, neither Wheeler et al., Rick et al., Katayama, or Hosono, when combined with Sasaki et al. is believed to teach or suggest the above-noted features of applicants' amended independent claims. The dependent claims are believed allowable for the same reasons as the independent claims from which they depend, as well as for their own additional characterizations. For example, claims 12 & 28 recite dynamically changing quantization matrix tables of a presently unused set of quantization matrix tables of the multiple sets while quantizing the sequence of video data using the one set of quantization matrix tables or the another set of quantization matrix tables. These claims recite changing one set of matrix tables while another set of matrix tables is currently being used, again in a single pass operation. A careful reading of the applied art fails to disclose any similar teaching or suggestion.

As noted above, independent claim 29 was initially rejected as anticipated by the teachings of Wheeler et al. This rejection is again respectfully traversed and reconsideration is requested.

Wheeler et al. describe a method and apparatus for performing fast division in accordance with certain bandwidth requirements particular to an implementation. A pseudo pipelined approach for performing division using the SRT non-restoring division algorithm is described which uses a minor clock in a major clock cycle time. The number of stages in the division pipeline is a function of the parameters bandwidth requirements of the system.

More particular to the present invention, the patent describes at column 13, lines 18-32 a quantization unit 644 (FIG. 28). In the preferred embodiment, there are two quantization tables; one table is used when operating on intra-coded macroblocks, and the other table is used on non-intra-coded macro blocks. These quantization tables are stored in queue table RAMS 690.

Applicants respectfully submit that there are significant differences between their claimed encoding technique and that employed in Wheeler et al. Wheeler et al. is simply describing the MPEG standard which requires the use of an intra coded matrix table and a non-intra coded matrix table, and therefore requires a switching from the intra table to the non-intra table during the encoding process. In contrast, the present invention assumes the normal "real time" switching of intra and non-intra tables, but further adds the ability to dynamically switch from <u>one complete set of intra and non-intra tables</u> to <u>another complete set of intra and non-intra tables</u> in real time, in a single pass without requiring stopping of the encoding process.

Further, each of the independent claims presented herewith has been amended to recite that each set of quantization matrix tables includes at least one intra matrix table and at least one non-intra matrix table. Based upon this definition of a set of

matrix tables, and applicants' recitation of dynamically switching between sets, applicants respectfully submit that a careful reading of Wheeler et al. would not have anticipated or even rendered obvious the subject matter of the present application. Therefore, reconsideration and withdrawal of the anticipation rejection to claim 29 is respectfully requested.

No new matter is believed added to the application by any amendment presented herewith.

Applicants respectfully submit that the application is in condition for allowance and request such action. If, however, the Examiner continues to entertain reservations regarding the allowability of any claim presented herewith, he is requested to telephone applicants' undersigned representative prior to issuing a further Office Action in order to schedule an interview to discuss the application.

Respectfully submitted,

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